Base Year: 1999 By: S. Claire

SOURCE INVENTORY

CATEGORY #750

MISCELLANEOUS EMISSION SOURCES
ACCIDENTAL FIRES - STRUCTURAL

1999 EMISSIONS

Introduction

This category covers emissions from structural accidental fires, including building and mobile home fires. The method used to calculate emissions for this category conforms to the method used by ARB.

Methodology

The number of structural accidental fires was acquired from the state fire marshal's office. The throughput data for this base year was obtained by multiplying base year 1996 throughput by population growth.

For building and mobile home fires, an average percent structural loss per fire was calculated by dividing the total monetary damage due to fires by the product of the average value of a residence in California and the number of residential fires. The result is an average loss of 12.4% per fire. To determine the amount of material burned in a fire, the ARB staff contacted the National Association of Home Builders and Mr. Larson, Chief Building Inspector, City of Sacramento. According to the National Association of Home Builders, the average residence has approximately 1200 to 1500 square feet of floor space and an average of 10,000 to 12,000 board feet of lumber in its structure.

Assuming an average of one ton of material per 1000 board feet, an average residence would have approximately 11 tons of combustible material. With a rate of loss of 12.4%, the structural loss would be 1.36 tons per fire.

The National Bureau of Standards lists the combustible contents per square foot of the areas of the average home. These figures were multiplied by the percent of fires originally estimated to occur within each of these areas, and the products were then added to give a weighted average of 7.91 pounds per square foot as shown in the following table.

Area	Origin of Fires (%)	Combustible (lbs./sq.ft.)	Weighted Ave. (Lbs./sq.ft.)
Bedroom	28.96	10.4	3.012
Sleeping Area	0.20	10.4	.021
Dining Area	2.20	7.2	.159
Kitchen	53.92	6.8	3.667
Bathroom	6.32	7.0	.443
Laundry	8.08	7.2	.582
Office	0.17	7.9	.013
Other	0.13	9.6	.012
Sum of weighted averages			7.909

With a 12.4% loss rate and a factor of 7.91 pounds of combustible contents per square foot, and assuming an average floor space of 1300 square feet, the content loss for the average residential fire would be:

$$[(1300) \times (0.124) \times (7.91)] / 2000 = 0.63 \text{ tons/fire}$$

The amount burned per residential fire =

$$\text{Structural loss} + \text{Content loss}$$
$$= 1.36 + 0.63 = 2.0 \text{ tons/fire}$$

Structural fires were apportioned among counties based on total housing units.

Structural fire emission factors in pounds per ton of material burned for TOG, CO and PM were obtained from the results of tests on the burning of model wood buildings. The emission factor for NO_X was assumed to be similar to that listed in AP-42 for municipal refuse. These emission factors were converted to units of pounds per fire using the factor 1.95 tons/fire.

The emission factors are:

	PM	Organic	NO_X	SO_X	CO
Pounds/fire	21.1	27.1	7.8	0	327.6

Monthly Variation

The monthly distribution was taken to be the same as the monthly variation used in the BY87 Methodology calculation.

County Distribution

The number of fires was broken down by household population by county. This was used directly in the county distribution except for Solano and Sonoma which were adjusted to include only areas inside the District using household population.

TRENDS

Historical and future county projection were estimated using county household population.